

Calorifier Vessel Repair

Overview

As part of the commissioning process of an FPSO, built and commissioned in Korea, fresh water medium was utilised for the pressure systems. This water contained Microbial content (suphate reducing bacteria (SRBs)). After a 3 ½ year period, SRBs resulted in the break down of the vessel's parent substrate producing internal pitting, weld cracking and subsequent shutdown of the calorifier.

Scope

Replacement of the vessel was not an option as there was a 3-month lead time for replacement. Shutdown of the calorifier had also produced a welfare issue - personnel on board were unable to have a hot shower. Walker Technical would apply total encapsulation to the vessel repairing all defects. Emergency category job.

Challenges

Walker Technical had to manage their operational rota within a busy window in order to mobilise a Technowrap™ Installer within short notice in response to the emergency job. Materials also had to be shipped to the installation environment to arrive timely and in conjunction with the installer, ready to begin the repair.

Our Approach

The vessel specification was a design pressure of 8 Bar, design temperature of 85°C and vessel substrate comprising of 304 grade stainless steel. Due to the ambient environment the repair would be installed within, the Technowrap 2K H.A™ (High Ambient) system was used for successful repair installation restoring the vessel to its full integrity and to its original design specification.



Closed Drain Line Repair Above Splash Zone

Overview

A closed drain system section within the splashzone area was identified as having suffered circumferential weld cracking, internal erosion and local wall thinning leading to a pinhole through-wall-defect. A temporary bandage repair had also been applied.

Scope

A Technowrap 2K™ repair would be installed repairing the defected area providing a design lifetime extension of 3 years. This 2K™ repair was also suitable for the assets design pressure of 11.34 Bar and design temperature of 38°C.

Challenges

Walker Technical now have Technowrap™ Splashzone for installing repairs within the Splashzone area, however within this case, prior to this product innovation, the standard Technowrap 2K™ was installed with the added challenge of keeping the composite clean and dry during application to ensure successful installation. Another challenge was getting access to the area where the repair required installation.

Our Approach

Using a custom built platform and habitat gave a degree of protection from the weather and from any stray waves rising higher than the platform floor. Rope access trained personnel applied the repair at height from a suspended platform at the required location.

This particular case demonstrates our ability to work effectively in conjunction with the operational requirements found within the offshore environment. Throughout the repair duration, the team co-ordinated installation with the platform control room and standby vessels. Due to the installation environment i.e. overside work, this had to be planned around helicopter schedules, supply boat operations, the weather, sea state, wind speed and visibility.



Concrete Sump Repair

Overview

A square concrete sump located underneath a concrete jetty had sustained cracks at the top connection between the sump and the sea jetty. During operation the liquid level of the sump would rise to the top of the sump and the contents, an oil and water mixture, would seep through these cracks. The leakage of this oil/water liquid into the sea created an environmental issue requiring a long term repair solution.

Scope

It was not possible to replace the damaged sump and previous alternative repair methods attempted were unsuccessful. From a design engineered perspective, Technowrap 2K™ was ideal in repairing the sump whilst also providing the sump with an extended design life of 20 years.

Challenges

Operationally and the installation procedure of Technowrap 2K™ meant there was a limited implementation time per day before tide level rising.

Our Approach

Pre-fabricated sections of the repair were manufactured at Walker Technical and shipped to the jetty location ensuring curing could take place prior to the incoming tide.



Cooling Water Line - Limited Landing Area

Overview

A weld on a cooling water return line had an internal corrosion defect, taking it close to the minimum allowable wall thickness.

The line was 30" in diameter making replacement expensive and a time consuming project. Compounding these difficulties is the location of the line, approximately 12 metres below sea level in a concrete leg structure. Moving pipe section of that size within concrete legs is a major logistical task. It would also result in total platform shutdown for duration of the replacement operation.

Scope

Applying a composite repair would resolve many of these challenges associated with line replacement. Following results of line calculations carried out, a composite design engineered repair was applied extending the lifetime of the line for a further 2 years.

Challenges

Due to the line's position and the way the pipe section had been fabricated, total encapsulation of the flange would normally be required. However, access to the structural steel above the flange was not possible implying a reduced landing zone for the composite onto good, shot blasted steel.

Our Approach

The repair was designed for a reduced landing of 110mm, compared to the original of 160mm as stipulated in the original design. This allowed for the repair to finish on the edge of the flange while still maintaining the integrity of the line.



High Temperature Flare Line Repair

Overview

A high temperature flare line was suffering from a combination of external corrosion and internal erosion. The pipework contents also included high levels of H²S implying difficulty in maintaining safe access with potential of sour gas egress.

Scope

The replacement of pipework could not be scheduled until a further 3 ½ years. It was therefore critical a fully engineered composite repair be installed with total encapsulation of the temporary clamps and corresponding pipe work.

HSE regulations state in the Guidelines for Repairs to Pipework - HSE 2001/038 Temporary/Permanent Repairs, that temporary clamps must be replaced or upgraded within a 2 year period.

Challenges

Due to the H²S factor, this content was diverted through another flare system during installation of the composite repair. Despite this the Client's Safety Case stated that breathing apparatus must be worn until the first 3 layers of Technowrap 2K H.T™ was applied. Thereafter the system was deemed safe to apply the remaining layers as per design application and without breathing apparatus.

Because the composite repair was used to encapsulate clamps already being used as a temporary repair on the line, a design calculation was also required for each of these clamps, due to their additional weightings and the impact this would have within designing an overall successful, fit-for-purpose composite repair.

Our Approach

As per design calculations a repair was installed using Technowrap 2K H.T™, a high temperature system capable of installing a repair to this particular lines design operating temperature of 204°C. A post cure method was used with Barcol hardness checks to ensure the repair systems full cure.



Hydrocarbon Gas - Metering Skid Line Repair

Overview

A major Metering Skid Line, with 17 platforms feeding into the system, was found to have Corrosion Under Insulation (CUI), and the Remaining Wall Thickness (RWT) was below 50% of the maximum allowable working pressure.

With 17 platforms feeding into the system, shutting down this crucial line would not be an easy option. The alternative, of installing a composite repair to the 'live' system was viewed as best course of action for this maintenance requirement.

Scope

The line was a 16 x 8" branch section. Due to Stress loadings (axial loads and bending moments), stress analysis was required in the XYZ axis of the 8" branch. A design analysis was completed with recommendation to install the Technowrap 2K™ system whilst the line was 'live'.

Challenges

The remaining wall thickness of the line was measured and risk assessment completed, to assign which surface preparation the steel would take. In this specific case, SA2½ was carried out. Due to this particular repair, emphasis of stress analysis data was crucial to the repair design.

Our Approach

A Walker Technical technician mobilised at short notice to begin the installation process and to provide total encapsulation of the line using the Techowrap 2K™ system. This design engineered repair extended the life time of this crucial line by a further 20 years. Post cure and barcol hardness checks were undertaken to ensure complete cure was achieved.



Oil Export Line Repair

Overview

Various valves and branches from a crude oil export line were suffering internal corrosion and wall thinning, resulting in the pipe having as little as 2mm of a wall thickness.

Scope

Replacement of the pipe section was not practical therefore maintenance was to take form of an engineered fit-for-purpose composite repair. This repair method would enable more time for operations to source fabrication of a replacement line section with the relevant valves and branches.

Challenges

Operating temperature of the line was 120°C: 30°C higher than the maximum temperature the standard Technowrap 2K™ system can be applied to. Walker Technical developed the resin used as part of the Technowrap 2K™ standard product to allow application to pipe lines operating up to a maximum of 220°C.

Our Approach

Through adaptation of the standard resin used within the Technowrap 2K™ system, a high temperature (H.T.) repair was installed successfully providing the line with an extended design life of 2 years until fabrication of the new line replacement would be complete, allowing change out the existing pipe work.



Glycol Tank Repair

Overview

A glycol tank (part of the water injection pump skid) suffered a 4mm single fillet weld rupture due to high vibration levels on the skid. A repair was required.

Scope

A shut down of the WI package was estimated to cost 13 Million GBP per week. In addition to this, there was a 3 month lead time for the tanks manufacture and replacement.

Challenges

Within this specific maintenance task it was evident the standard installation technique may fail to reach full compression prior to the curing stage. To remedy this, a new approach was taken in installing the standard Techowrap 2K™ system whilst vacuum bagging procedures were used to ensure full compression achievement prior cure.

Our Approach

Following repair installation with implementation of vacuum bagging techniques, the tank still had ongoing vibration. However it was still in service 12 months following the repair installation. At this time an opportune shut down period had still not yet occurred for the original planned tank change out.

